ACCESSION #: 9207210319
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Palo Verde 2 PAGE: 1 OF 12

DOCKET NUMBER: 05000529

TITLE: Unit 2 Reactor Trip with Loss of Power (LOP) ESFAS and Unit 3 LOP ESFAS
EVENT DATE: 03/23/92 LER #: 92-002-01 REPORT DATE: 07/14/92

OTHER FACILITIES INVOLVED: Palo Verde Unit 3 DOCKET NO: 05000530

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Thomas R. Bradish, Compliance Manager TELEPHONE: (602) 393-5421

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: EA COMPONENT: DISC MANUFACTURER: S188
REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

At approximately 0953 MST on March 23, 1992, Palo Verde Units 2 and 3 were in Mode 1 (POWER OPERATION) operating at approximately 100 percent power when a reactor trip and Train A Loss of Power (LOP) Engineered Safety Feature Actuation System (ESFAS) actuation occurred in Unit 2, and a Train B LOP ESFAS occurred in Unit 3. A fault on a startup transformer disconnect switch occurred during the performance of preventive maintenance to exercise supply breakers to the Unit 2 Train A non-Class 1E 13.8 kV Switchgear Bus, resulting in a loss of offsite power to two of four reactor coolant pumps (RCP) in Unit 2 and subsequent reactor trip. This also resulted in a loss of power to the Unit 2 Train A and Unit 3 Train B Class 1E 4.16 kV buses, and LOP ESFAS actuations. The Unit 2 Train A Emergency Diesel Generator (EDG) and the Unit 3 Train B EDG started and loaded per design. All equipment functioned as designed. There were no other ESFAS actuations and none were required. Unit 3 continued to operate normally at 100 percent power throughout the event.

The event in Unit 2 was diagnosed as an uncomplicated reactor trip. At approximately 1020 MST on March 23, 1992, Unit 2 was stabilized in Mode 3 (HOT STANDBY) at normal temperature and pressure.

As corrective action, the three disconnect pole assembles on the disconnect switch were replaced.

There have been no previous similar events reported pursuant to 10CFR50.73.

END OF ABSTRACT

I. DESCRIPTION OF WHAT OCCURRED:

A. Initial Conditions:

At 0953 MST on March 23, 1992, Palo Verde Units 2 and 3 were in Mode 1 (POWER OPERATION) operating at approximately 100 percent power.

B. Reportable Event Description (Including Dates and Approximate Times of Major Occurrences):

Event Classification: An event or condition that resulted in an automatic actuation of an Engineered Safety Feature (ESF)(JE) and the Reactor Protection System (RPS)(JC).

At approximately 0953 MST on March 23, 1992, Palo Verde Unit 2 experienced an automatic reactor (RCT)(AC) trip and Train A Loss of Power (LOP) Engineered Safety Feature Actuation System (ESFAS) (JE) actuation, and Unit 3 experienced a Train B LOP ESFAS. Immediately prior to the reactor trip and LOP ESFAS actuations, a fault on a startup transformer (EA)(XFMR) disconnect switch (DISC) occurred during the performance of preventive maintenance (pm) to exercise supply breakers (BKR) to the Unit 2 Train A non-Class 1E 13.8 kV Switchgear Bus (BU)(SWGR)(EA). This fault resulted in a loss of offsite power to two of four reactor coolant pumps (RCP) (AB)(P) in Unit 2 and subsequent reactor trip. This also resulted in a loss of power to the Unit 2 Train A and Unit 3 Train B Class 1E 4.16 kV buses (EB)(BU), and LOP ESFAS actuations. The Unit 2 Train A Emergency Diesel Generator (EK) (EDG) and the Unit 3 Train B

EDG started and loaded per design. All equipment functioned as designed. There were no other ESFAS actuations and none were required. Unit 3 continued to operate normally at 100 percent power throughout the event. The event in Unit 2 was diagnosed as an uncomplicated reactor trip. At approximately 1020 MST on March 23, 1992, Unit 2 was stabilized in Mode 3 (HOT STANDBY) at normal temperature and pressure.

Prior to the event, on March 23, 1992, Unit 2 Control Room personnel (utility, licensed) were performing a PM task to exercise supply breakers to the Train A non-Class 1E 13.8 kV Switchgear Bus NAN-S01. [NOTE: Reference the figure on page 12.] To satisfy the requirement of the PM task, Control Room personnel transferred the in-house NAN-S01's power supply from the Unit Auxiliary Transformer MAN-X02 (EA)(XFMR) to the offsite Train A non-Class 1E 13.8 kV Switchgear Bus NAN-S03 by closing cross tie supply breaker NAN-S03B. After the cross tie supply breaker NAN-

S03B was closed, a successful transfer from the in-house power supply (MAN-X02) to the offsite bus (NAN-S03) occurred when the supply breaker NAN-S01A opened as designed.

At approximately 0953 MST on March 23, 1992, approximately nine (9) seconds after the cross tie supply breaker NAN-S03B was closed in Unit 2, numerous electrical system alarms (ALM) came in to the Unit 2 and Unit 3 Control Room control boards (CBD)(NA). Unit 2 Control Room personnel observed that the cross tie supply breaker NAN-S03B was closed but that there was no power from the Startup Transformer NAN-X01 to either Unit 2 Train A non-Class 1E 13.8 kV Switchgear Bus (NAN-S03 or NAN-S01). In addition, the NAN-X01 breakers were observed to be open, indicating a fault on NAN-X01. Unit 3 Control Room personnel (utility, licensed) observed that a loss of power had occurred on the Unit 3 Train B non-Class 1E 13.8 kV Switchgear Bus NAN-S04.

Unit 2's Train A non-Class 1E 13.8 kV Switchgear Bus NAN-S01 was deenergized as a result of the fault on NAN-X01's disconnect switch. Non-Class 1E power was lost to Train A reactor coolant pumps (RCP 1A and RCP 2A), two circulating water pumps (NN)(P) (CWPs), two condensate pumps (SD)(P) (CDPs), one heater drain pump (SM)(DRN)(P), and approximately one-half of the non-Class 1E load centers and motor control centers (MCC). This was the expected result of a loss of NAN-S01. The Core Protection Calculators (JC) responded to the loss of power to the two of four RCPs and subsequent low RCP speed trip condition by generating low Departure from Nucleate Boiling Ratio (DNBR) trip signals on all four channels of the Plant Protection System (PPS) (JC). The Unit 2 reactor tripped, followed by a Main Turbine/Main Generator (TA/TB) trip.

Unit 2's Train A non-Class 1E 13.8 kV Switchgear Buses (NAN-S03 and NAN-S05) were deenergized as a result of the fault on NAN-X01's disconnect switch. This resulted in the loss of offsite power to the Train A 4.16 kV Class 1E bus (PBA-S03) and a Train A LOP ESFAS actuation. The ESF signal automatically load shed the Train A Class 1E bus and started the Train A Emergency Diesel Generator (EDG). The Train A EDG started and assumed the loads as designed. Unit 2 Control Room personnel entered Technical Specification Limiting Condition for Operation (TS LCO) 3.8.1.1 ACTION a (i.e., one offsite circuit inoperable).

The fault on NAN-X01's disconnect switch also deenergized Unit 3's Train B non-Class 1E 13.8 kV Switchgear Buses (NAN-S04 and NAN-S06). This resulted in the loss of offsite power to the Train B 4.16 kV Class 1E bus (PBB-S04) and a Train B LOP ESFAS actuation. The ESF signal automatically load shed the Train B Class 1E bus

and started the Train B EDG. The Train B EDG started and assumed the loads as designed. The Unit 3 Control Room personnel diagnosed the event as a partial loss of offsite power and entered TS LCO 3.8.1.1 ACTION a (i.e., one offsite circuit inoperable). The Unit 3 RCPs remained energized because they were being powered from the Unit Auxiliary Transformer MAN-X03.

There were no other ESFAS actuations and none were required. Unit 2 and Unit 3 plant equipment responded as expected for a loss of power scenario. Unit 2 Control Room personnel diagnosed the event as an uncomplicated reactor trip with a partial loss of non-Class 1E power. At approximately 1020 MST on March 23, 1992, Unit 2 was stabilized in Mode 3 (HOT STANDBY) at normal temperature and pressure. Unit 3 continued to operate normally at 100 percent power throughout the event.

At approximately 1106 MST, Unit 2 Control Room personnel reenergized the Train A non-Class 1E 13.8 kV Switchgear Buses (NAN-S03 and NAN-S05) from the alternate supply breaker feed from Startup Transformer NAN-X02. At approximately 1130 MST, Unit 2 Control Room personnel reenergized the majority of the non-Class 1E NAN-S01 load centers. At approximately 1144 MST, Unit 3 Control Room personnel reenergized the Train B non-Class 1E 13.8 kV Switchgear Buses (NAN-S04 and NAN-S06) from the alternate supply breaker feed from Startup Transformer NAN-X03.

At approximately 1307 MST, Unit 2 exited TS LCO 3.8.1.1 ACTION a when offsite power was restored to Train A 4.16 kV Class 1E bus (PBA-S03) from NAN-X02. At approximately 1336 MST, Unit 3 exited TS LCO 3.8.1.1 ACTION a when offsite power was restored to the Train B 4.16 kV Class 1E bus (PBB-S04) from NAN-X03. In Unit 2, at approximately 1646 MST, RCP 1A was restarted and, at approximately 1721 MST, RCP 2A was restarted.

C. Status of structures, systems, or components that were inoperable at the start of the event that contributed to the event:

The manual disconnect switch did not go to the fully closed position on February 4, 1992, the last date that the disconnect switch was operated. To be fully closed, the blade of the disconnect switch must be rotated to the fully horizontal position after the blade hits the closed position stop. There were no other structures, systems, or components that were inoperable at the start of the event that contributed to the event.

D. Cause of each component or system failure, if known:

An integrated investigation of this event was conducted in accordance with the APS Incident Investigation Program. As part

of the investigation, a root cause of failure analysis of the disconnect switch was performed by APS Engineering personnel. An APS Engineering evaluation has determined that the Startup Transformer NAN-X01 related fault was due to the disconnect switch not going to fully closed when it was last operated, resulting in a high resistance connection. The disconnect switch vendor manual states that when closing the switch, the blade enters the contact area at an angle. Final rotation of the blade tip to the horizontal position occurs after the blade has hit the closed position stop. During this rotation of the blade tip, contact pressure between the blade and the contact fingers is increased.

APS Engineering determined that loose bolts on the Phase C pole assembly of the Z winding disconnect switch prevented the operating mechanism from providing the force necessary to fully close (i.e., fully rotated in the horizontal position) the disconnect switch.

E. Failure mode, mechanism, and effect of each failed component, if known:

[NOTE: Startup Transformer NAN-X01 normally supplies offsite power to the Unit 2 Train A non-Class 1E 13.8 kV Switchgear Buses (NAN-S05 and NAN-S03) from the Z winding, and to the Unit 3 Train B non-Class 1E 13.8 kV Switchgear Buses (NAN-S06 and NAN-S04) from the Y winding.]

Following the manual transfer discussed in Section I.B, the Startup Transformer NAN-X01 powered the Unit 2 non-Class 1E 13.8 kV Switchgear Buses (NAN-S03 and NAN-S01). Approximately nine (9) seconds later, Unit 2 non-Class 1E 13.8 kV Intermediate Switchgear Bus NAN-S05 experienced a zero sequence voltage, and neutral amperage (amp) increased on the 525 kV and the 13.8 kV Z winding sides of NAN-X01. This abnormality was indicative of a load imbalance and/or a fault in progress. At approximately 0953 MST, the 525 KV switchyard (FK) circuit breakers PL925 and PL928 opened and isolated NAN-X01. This was immediately followed by the opening of Unit 3's Train B non-Class 1E 13.8 kV Intermediate Switchgear Bus NAN-S06 normal supply breaker NAN-S06C (resulting in a loss of power to Unit 3's NAN-S06 and NAN-S04) and Unit 2's NAN-S05 normal supply breaker NAN-S05D (resulting in a loss of power to Unit 2's NAN-S05 and NAN-S03). The Unit 2 Control Room personnel observed that the cross tie supply breaker NAN-S03B was closed, there was no power from NAN-X01 to either NAN-S03 or NAN-S01, and the NAN-X01 breakers were open.

The investigation determined that loose bolts on the Phase C pole assembly of the Z winding disconnect switch prevented the operating mechanism from providing the force necessary to fully close the disconnect switch, resulting in a high resistance connection. The connection functioned adequately with the normal loads of the Z winding disconnect switch which normally consist of the Unit 2 non-Class 1E 13.8 kV Switchgear Bus NAN-S03 ESF loads of approximately 100 amps. When the manual transfer was performed, the Z winding disconnect switch was loaded with the Train A non-Class 1E electrical components (2 RCPs, 2 CWPs, 2 CDPs, a heater drain pump, and approximately one-half of load centers and MCCs). The connection failed when exposed to the additional loads of approximately 1700 amps. The high resistance connection experienced arcing and subsequent flashover. A current imbalance occurred due to Phase C resistance being greater than Phases A and B, resulting in the actuation of the transformer differential current protection relay.

F. For failures of components with multiple functions, list of systems or secondary functions that were also affected:

Not applicable - no failures of components with multiple functions were involved.

G. For a failure that rendered a train of a safety system inoperable, estimated time elapsed from the discovery of the failure until the train was returned to service:

Not applicable - no failures that rendered a train of a safety system inoperable were involved.

H. Method of discovery of each component or system failure or procedural error:

The disconnect switch not being in the fully closed position was discovered during an investigation immediately following the event. There were no procedural errors which contributed to this event; however, the procedures were not fully adequate as described below.

I. Cause of Event:

An integrated investigation into this event was conducted in accordance with the APS Incident Investigation Program. The cause of the trip was due to the component failure as discussed in Section I.D (SALP Cause Code E: Component Failure).

Contributing to the event was that the auxiliary operator (AO) who closed the disconnect switch on February 4, 1992 was unaware that the blade of the disconnect switch had to turn to the horizontal

position to complete the closure. The AO observed the disconnect switch go against the disconnect stop and cranked the disconnect switch operator until there was resistance on the operator handle. The AO observed that the position indicator did not show fully closed. The AO continued to turn the crank until a clank noise occurred and the resistance ceased. The AO lined the indicator against its stop and verified the disconnect to be closed by checking the indicator against the stop and observing the disconnect blade to be lying against the disconnect stop.

Procedural guidance did not require the AO to verify the position of the blades, nor had training been provided regarding the proper blade position. The disconnect switch is located approximately fifteen feet above the ground; however, no unusual characteristics of the work location (e.g., noise, heat, poor lighting) directly contributed to this event.

J. Safety System Response:

Following the loss of power to Unit 2's Train A and Unit 3's Train B Class 1E 4.16 kV buses, the respective Train A and Train B Emergency Diesel Generators started and energized their Train A and Train B ESF buses within the Technical Specification time requirement. Both Unit 2 and Unit 3's load sequencers initiated a Load Shed signal and subsequently resequenced the following safety systems on the respective buses as required by design:

Control Room Essential Ventilation (VI), Diesel Generator Essential Ventilation (VJ), Essential Battery Chargers and Voltage Regulators reenergized (BYC)(EI), Containment Normal Air Handling Units (AHU) (NH) restarted, Control Element Drive Mechanism Normal Air Handling Units (AHU)(AA) restarted, Auxiliary Feedwater Pump (P)(BA), Essential Cooling Water Pumps (P)(BI), Essential Spray Pond Pumps (P)(BI), and Essential Chillers (CHU)(KM).

For the Unit 2 reactor trip event, the reactor protection system operated as designed upon detecting the low RCP speed trip condition by generating low Departure from Nucleate Boiling Ratio (DNBR) trip signals on all four channels of the Plant Protection System (PPS). There were no other ESFAS actuations and none were required.

K. Failed Component Information:

The manufacturer of the disconnect switch is Siemans-Allis. The manufacturer's part number is 23-138-484-003/S-A. The Phase C of the Z winding part description is listed as a single pole

assembly, 15 kV, 3000 A, 120 kA, momentary amps for 2 outside Phases A and C.

II. ASSESSMENT OF THE SAFETY CONSEQUENCES AND IMPLICATIONS OF THIS EVENT:

A safety limit evaluation was performed in accordance with the APS Incident Investigation Program. The evaluation determined that no safety limits were violated and that the event (i.e., reactor trip and loss of offsite power) is bounded by previous analyses contained in the Updated Final Safety Analysis Report Chapters 6 and 15. The Unit 2's Train A and Unit 3's Train B Emergency Diesel Generators started properly and assumed the loads on the respective trains of the Class 1E 4.16 kV buses. All components operated as designed with no abnormalities.

The Unit 2 and Unit 3 events did not result in any challenges to fission product barriers or result in any releases of radioactive materials. There were no safety consequences or implications as a result of the events. The events did not adversely affect the health and safety of the public.

III. CORRECTIVE ACTION:

A. Immediate:

APS Engineering personnel (utility, nonlicensed) inspected Startup Transformer NAN-X01. Transformer oil analysis, Turn-to-Turn-Ratio (TTR), doble and electrical meggar testing revealed that no damage to the transformer had occurred as a result of the event. In addition, visual inspections of the affected buses (NAN-S01, NAN-S03, and NAN-S05) in Unit 2 were performed and no abnormalities were found.

A visual inspection of the Z winding disconnect switch disclosed physical damage to the Phase C pole assembly. Burn marks were found on the three phases (A, B, and C pole assemblies) of the disconnect switch. The three disconnect pole assembles (Phases A, B, and C) on the Z winding disconnect switch were replaced.

The other switchyard startup transformer manually operated disconnect switches were visually inspected and no abnormalities were found.

B. Action to Prevent Recurrence:

The nonlicensed operator (NLO) training given to auxiliary operators on the operation of the disconnect switches was reviewed. The event reported in this LER (529/92-002) will be incorporated into the third quarter NLO training cycle for 1992.

Procedural enhancements have been completed to verify the position of the blades on the disconnect switches.

IV. PREVIOUS SIMILAR EVENTS:

No other previous events have been reported pursuant to 10CFR50.73 where a failure of a disconnect switch in the switchyard caused a reactor trip and loss of offsite power.

V. ADDITIONAL INFORMATION:

Subsequent to the Unit 2 reactor trip, LOP ESFAS, and loss of Train A non-Class 1E power, two significant water hammer events occurred on the secondary side of the plant. There were also some additional low intensity water hammer occurrences. Unit 2's Train A non-Class 1E 13.8 Kv Switchgear Bus NAN-S01 was deenergized following the fault on NAN-X01's disconnect switch. As a result, non-Class 1E power was lost to two of four reactor coolant pumps (RCP 1A and RCP 2A), two circulating water pumps (CWPs), two condensate pumps (CDP A and CDP B), one heater drain pump, and approximately one-half of the non-Class 1E load centers and MCCs. This was the expected result of a loss of NAN-S01.

THE FIRST WATER HAMMER EVENT:

Prior to the first water hammer event, both main feedwater pumps (SJ)(P) were tripped and two condensate pumps (A and B) were deenergized. Condensate pump C tripped on low flow due to a problem with the minimum recirculation control valve. Heater drain pump A was still in service on minimum recirculation for approximately ninety minutes following the Main Turbine trip. Condenser (SG) vacuum was maintained during the entire event.

Approximately forty-five minutes after the Main Turbine trip, the first water hammer initiated and continued for approximately thirty minutes. The water hammer was centered in the main feedwater pump suction lines. The first water hammer event subsided approximately 10 minutes after Operations personnel secured heater drain pump A.

The cause of the first water hammer was the continued operation of heater drain pump A following the Main Turbine trip. With the three condensate pumps out of service, the pressure in the main feedwater pump suction lines dropped to saturation. This condition coupled with the normal leak off flow from the main feedwater pump shaft seals further depressurized the condensate and feedwater piping. As a result, steam voids formed in the main feedwater pump suction lines. When the level in the heater drain tank reached a setpoint, the heater drain pump discharge control valve opened, and the heater drain pump A injected water into the feedwater pump suction lines with the steam voids present, resulting in the water hammer event.

THE SECOND WATER HAMMER EVENT:

The second water hammer event occurred during the alignment of the condensate and feedwater systems for long path recirculation. This configuration uses a single condensate pump to circulate water from the condenser hotwell, through the low pressure feedwater heaters, bypassing the main feedwater pumps, through the high pressure feedwater heaters, and finally returning the flow to the condenser. The long path recirculation is used to perform a controlled cooldown of both the condensate and feedwater systems following a Main Turbine trip. During a normal turbine trip, at least one condensate pump is kept in operation to maintain an adequate subcooled margin and preclude steam void formation. The long path recirculation flow is initiated by opening a low flow two-inch valve (VA031) into the

Main Condenser.

Operations personnel returned one condensate pump to service to remove excess water from the condenser and to align the secondary system for the long path recirculation. However, prior to opening a low flow two-inch recirculation valve (VA031) into the condenser, the condensate and feedwater piping was not pressurized because both flow paths through the polishing demineralizer service vessel and the demineralizer's bypass valve (CDNPV-195) were isolated. The polishing demineralizer service vessels were automatically isolated due to the inlet and outlet isolation valves shutting when power was restored to the demineralizer's control cabinet. The position indicator in the Control Room for CDNPV-195 was erroneously indicating 100 percent open, however, CDNPV-195 remained closed. The pressure indicator, that Operations personnel used to verify condensate header pressure, is located upstream of the CDNPV- 195 and the demineralizers. Therefore, the pressure was indicated at the normal pressure. Operations personnel believed that the condensate and feedwater headers were pressurized and initiated the long path recirculation by opening the low flow two-inch valve (VA031). This resulted in the piping downstream of the demineralizer being depressurized. The condensate and feedwater systems were maintained in this configuration for approximately ninety minutes prior to the detection of the demineralizer's bypass valve (CDNPV-195) being closed.

CDNPV-195 was manually opened, and Operations personnel attempted to slowly pressurize the condensate and feedwater piping. During the attempt to repressurize the piping, severe water hammering was observed on both feedwater pump suction lines. The severity of the water hammering subsided when Operations personnel stopped the pressurization process.

The second water hammer event occurred following the initiation of the long path recirculation with the condensate and feedwater piping in a voided condition. The steam void formations were present in the piping following depressurization. The extended time that the low flow two-inch bypass valve (VA031) was open, coupled with the normal leak off flow from the main feedwater pump shaft seals, depressurized the condensate and feedwater piping.

APS ENGINEERING EVALUATION AND CORRECTIVE ACTIONS:

APS Engineering personnel performed analyses to determine the water hammer loads and subsequent stresses in the condensate and feedwater piping, including loads on nozzles and pipe supports. Piping sections that were exposed to the water hammer and that were subjected to high stress were examined by visual inspection and/or magnetic particle testing. There were no indications of permanent deformation or failure, and the piping and nozzles were determined to be undamaged as a result of the water hammer event. As a result of the water hammer event, four pipe supports (i.e., seismic snubbers not designed for dynamic loading of the magnitude of a water hammer) were damaged. However, after stress analysis, the loads and stresses of the piping were found to be within code allowable limits for operation without the four damaged supports.

As immediate corrective action, a night order describing the water hammer events was issued in each unit. As action to prevent recurrence, guidance for tripping the heater drain pumps following a reactor trip will be proceduralized with the implementation of the upgraded Emergency Operating Procedures (EOPs). In addition, procedural guidance to establish long path recirculation following the loss of condensate flow has been incorporated into Operations procedures.

Figure omitted.

Arizona Public Service Company
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JAMES M. LEVINE 192-00794-JML/TRB/KR
VICE PRESIDENT July 14, 1992
NUCLEAR PRODUCTION

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Mail Station P1-37
Washington, D.C. 20555

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 2
Docket No. STN 50-529 (License No. NPF-51)

Licensee Event Report 92-002-01
File: 92-020-404

Attached please find Supplement 1 to Licensee Event Report (LER) 92-002 prepared and submitted pursuant to 10CFR50.73. This supplement is being submitted to update Section III.B Action to Prevent Recurrence. In accordance with 10CFR50.73(d), a copy of this supplement is being forwarded to the Regional Administrator, NRC Region V.

If you have any questions, please contact T. R. Bradish, Compliance Manager, at (602) 393-5421.

Very truly yours,

JML/TRB/KR

Attachment

cc: W. F. Conway (all with attachment)
J. B. Martin
D. H. Coe
INPO Records Center

*** END OF DOCUMENT ***